

C L A I M S

1. Bore hole tool assembly comprising a housing and a mandrel reaching along an axial direction into the housing and a bearing system for transferring an axial load between the housing and the mandrel and allowing  
5 rotation of the housing relative to and about the mandrel, wherein the bearing system comprises at least two bearing stages each arranged to transfer part of the axial load, whereby each bearing stage comprises bearing means and mitigation means for distributing the load  
10 substantially proportionally over the respective bearing stages.
2. Bore hole tool assembly according to claim 1, wherein the mitigation means comprises deformable means having a mechanical stiffness, arranged to transfer at least part  
15 of the axial load in series with the respective bearing means.
3. Bore hole tool assembly according to claim 2, wherein the mechanical stiffness of the deformation means in at least one of the bearing stages is lower than that of the  
20 housing and that of the mandrel in a section bridged by that bearing stage.
4. Bore hole tool assembly according to claim 2 or 3, wherein the mechanical stiffness of the deformable means in at least one of the bearing stages is different in  
25 magnitude from that of the deformable means in the other bearing stage or at least one other of the bearing stages.
5. Bore hole tool assembly according to any one of the previous claims, wherein the mechanical stiffness of the  
30 part of the housing that stretches between the bearing stages and the mechanical stiffness of the part of the

mandrel that stretches between the bearing stages differ from each other by less than a factor of 3.

6. Bore hole tool assembly according to any one of the previous claims, wherein the mandrel is a tubular end, and preferably the housing is a tubular end.

7. A bearing system, for use in a bore hole tool assembly, for transferring an axial load between a housing and a mandrel reaching along the axial direction into the housing, and allowing rotation of the housing relative to and about the mandrel, which bearing system comprises at least two bearing stages each arranged to transfer part of the axial load, whereby each bearing stage comprises bearing means and mitigation means for distributing the load substantially proportionally over the respective bearing stages.

8. Method of designing a bore hole tool assembly in accordance with any one of claims 1 to 6, comprising the steps of:

a) selecting a first bearing stage stiffness value for one bearing stage;  
b) calculating, for given stiffness values of the parts of the housing that stretch between the bearing stages and given stiffness values of the parts of the mandrel that stretch between the bearing stages, the value for the second bearing stage stiffness whereby the axial load is distributed substantially proportionally over the respective bearing stages, thereby using the first bearing stage stiffness value as input.

9. Method according to claim 8, wherein step b. comprises:

b1) determining a first stiffness ratio being the quotient of said first bearing stage stiffness and the stiffness of the housing;

b2) determining a second stiffness ratio being the quotient of said first bearing stage stiffness and the stiffness of the mandrel.